

Physics 30

Physical constants that may be used for calculations:

Universal Gravitation Constant: $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$

One coulomb = 6.24×10^{18} elementary charges

$e = 1.602 \times 10^{-19} \text{ C}$

Constant in Coulomb's Law: $k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$

Speed of light, $c = 3.00 \times 10^8 \text{ m/s}$

Electron volt, $\text{eV} = 1.60 \times 10^{-19} \text{ J}$

Planck's Constant, $h = 6.63 \times 10^{-34} \text{ Js}$

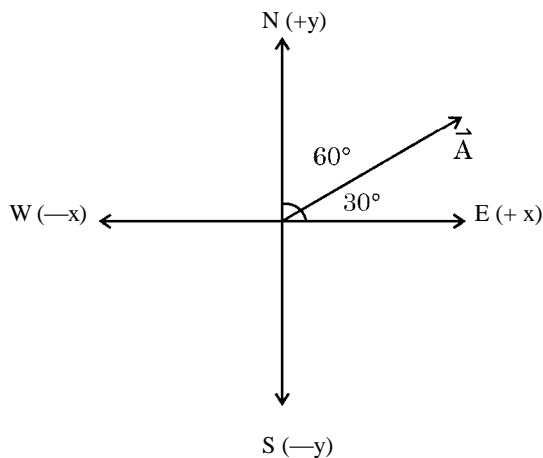
$h = 4.14 \times 10^{-15} \text{ eVs}$

Acceleration due to gravity (at Earth's surface), $g = 9.81 \text{ m/s}^2$ towards Earth's centre
or $g = -9.81 \text{ m/s}^2$

The following list of symbols indicates the symbols that have been adopted by the International Committee for Weights and Measures for use in the world-wide metric system (SI). These symbols are used throughout this test paper.

Unit	Symbol	Unit	Symbol
amperes	A	newtons	N
coulombs	C	ohms	Ω
hertz	Hz	seconds (time)	s
joules	J	volts	V
kilograms	kg	watts	W
metres	m		

Conventions used for expressing direction in Vector Quantities



Example:

The direction of vector A can be expressed as:

[E 30° N] or [N 60° E] or [30° N of E] or [60° E of N]

Some Useful Things

$$c^2 = a^2 + b^2$$
$$c^2 = a^2 + b^2 - 2ab \cos C$$

Physics Formulas

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = \pi r^2$$

Kinematics and Dynamics

$$\sum \vec{V}_x = \vec{V}_{x1} + \vec{V}_{x2} + \vec{V}_{x3} + \dots$$
$$\sum \vec{V}_y = \vec{V}_{y1} + \vec{V}_{y2} + \vec{V}_{y3} + \dots$$
$$\vec{V}_R = \sqrt{(\sum \vec{V}_x)^2 + (\sum \vec{V}_y)^2}$$
$$v_{av} = \frac{\Delta d}{\Delta t}$$
$$\vec{V}_{av} = \frac{\Delta \vec{d}}{\Delta t}$$
$$\vec{a}_{av} = \frac{\Delta \vec{v}}{\Delta t}$$
$$\vec{v}_2 = \vec{v}_1 + \vec{a} \Delta t$$
$$\vec{v}_{av} = \frac{\vec{v}_2 + \vec{v}_1}{2}$$
$$\Delta \vec{d} = \frac{1}{2}(\vec{v}_2 + \vec{v}_1) \Delta t$$

$$\Delta \vec{d} = \vec{v}_1 \Delta t + \frac{1}{2} \vec{a} (\Delta t)^2$$
$$\Delta \vec{d} = \vec{v}_2 \Delta t - \frac{1}{2} \vec{a} (\Delta t)^2$$
$$\vec{v}_2^2 = \vec{v}_1^2 + 2 \vec{a} \Delta \vec{d}$$
$$\vec{F}_{NET} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \dots$$
$$\vec{F}_g = m \vec{g}$$
$$\vec{F}_{NET} = m \vec{a}$$
$$\vec{F}_f = \mu F_N$$
$$T = \frac{t}{\text{cycles}}$$
$$f = \frac{\text{cycles}}{t}$$
$$T = \frac{1}{f}$$
$$f = \frac{1}{T}$$

$$\vec{v} = \frac{2\pi r}{t}$$
$$\vec{v} = \frac{2\pi r}{T}$$
$$\vec{a} = \frac{\vec{v}^2}{r}$$
$$\vec{a} = \frac{4\pi^2 r}{T^2}$$
$$\vec{a} = 4\pi^2 r f^2$$
$$\vec{F}_c = m \vec{a}_c$$
$$\vec{F}_g = \frac{G m_1 m_2}{\vec{d}^2}$$
$$\vec{p} = m \vec{v}$$
$$\Delta \vec{p} = m \Delta \vec{v} = \vec{J}$$
$$\vec{F} \Delta t = m \Delta \vec{v}$$
$$P = P'$$

Mechanical Energy

$$W = \Delta E$$
$$W = F \Delta d \cos \theta$$
$$E_k = \frac{1}{2} m v^2$$
$$E_p = m g \Delta h$$
$$F_s = -kx$$
$$E_p = \frac{1}{2} k x^2$$

$$E_m = E_k + E_p$$
$$E_m = E'_m$$
$$P = \frac{W}{t} = \frac{\Delta E}{t}$$
$$P = \frac{F \Delta d}{t}$$
$$P = F v$$

$$eff. = \frac{E_{out}}{E_{in}}$$
$$eff. = \frac{P_{out}}{P_{in}}$$

Electricity

$$|F_e| = \frac{k q_1 q_2}{r^2}$$

Modern Physics

$$E = h \nu$$

Nuclear Physics

$$A = Z + N$$
$$E = m c^2$$
$$\Delta m = m_{nucleons} - m_{nucleus}$$

$$N = N_0 \left(\frac{1}{2} \right)^n$$